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E-CIGARETTE & JUUL PREVENTION PROGRAM

E-Cigarettes & JUUL:

What Schools & Parents Should Know

An introduction to CATCH My Breath

THE CONCERN

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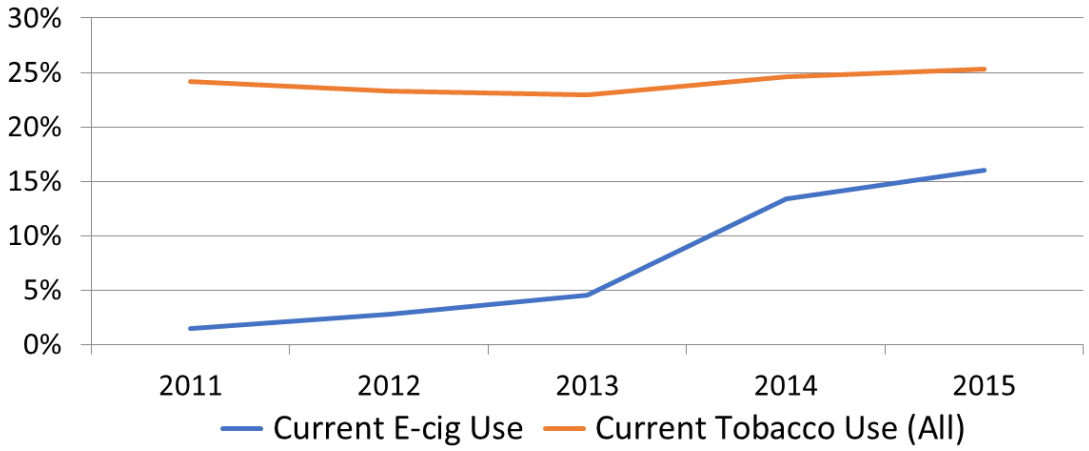
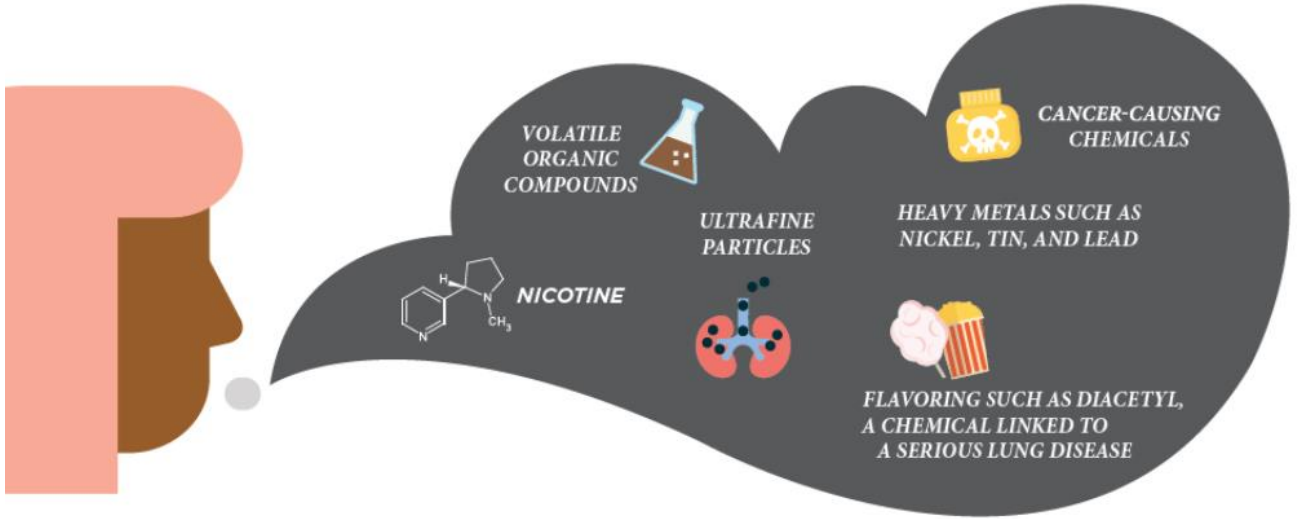
E-Cigarette Rise in Popularity among Youth



(CDC, National Youth Tobacco Survey Data)

E-Cigarette use is not safe for young



An unhealthy habit

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Most e-cigarettes contain *nicotine*, which is highly addictive and can *harm brain development*, which continues until about *age 25*.

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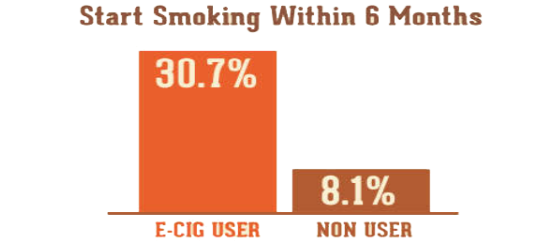
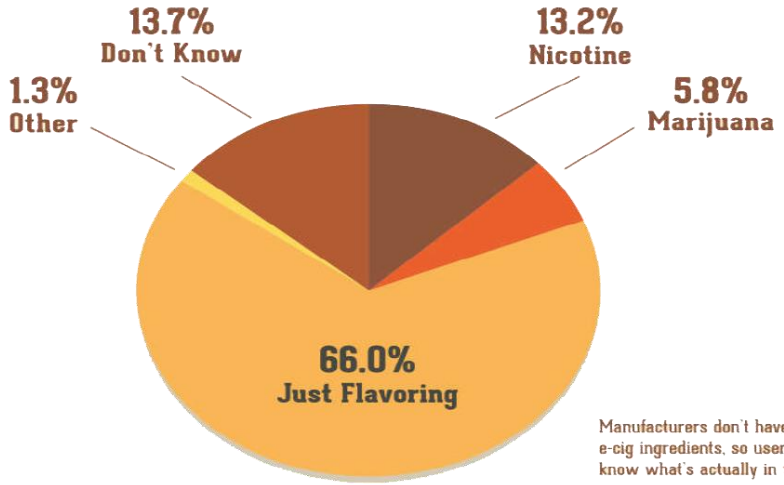
TEEN E-CIG USERS ARE MORE LIKELY TO START SMOKING.*[2]



*Includes combustible tobacco products (cigarettes, cigars, and hookahs)

WHAT DO TEENS SAY IS IN THEIR E-CIG?[3]



Manufacturers don't have to report e-cig ingredients, so users don't know what's actually in them.

NIH National Institute on Drug Abuse

Components of E-Cigarettes

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- Parts of a typical E-Cigarette
  - Battery
  - Microprocessor
  - Heater/Atomizer
  - Cartridge/Tank

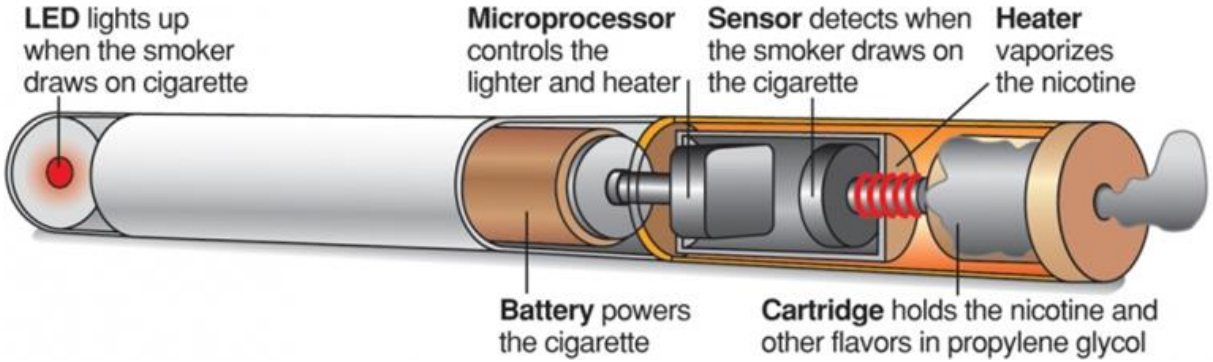

Image Source: Standard-Examiner

3 Types of E-Cigarettes

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1

2

3

E-juice: Sweet Flavors Abound

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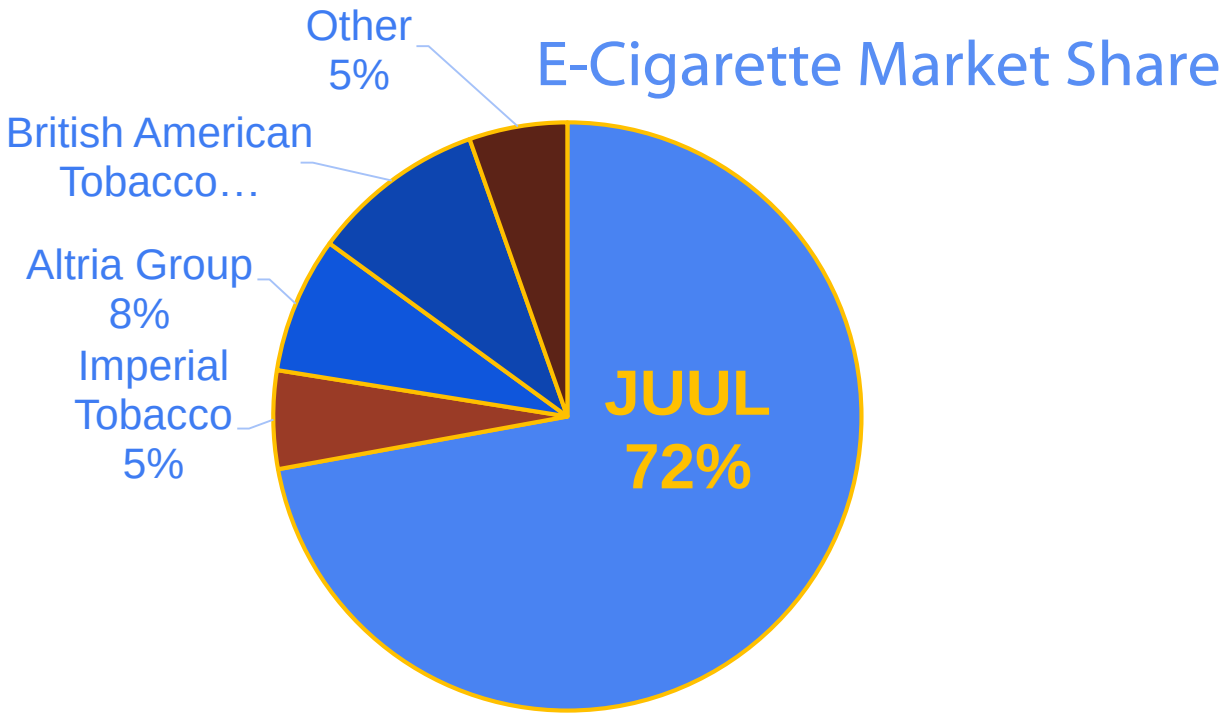
- 81% of kids who ever used tobacco products started with a flavored product.[1]
- 99% of E-Cigarettes sold in 2015 contained nicotine.[2]

Sources: [1]Journal of the American Medical Association; [2]Truth Initiative

Growth of juul use

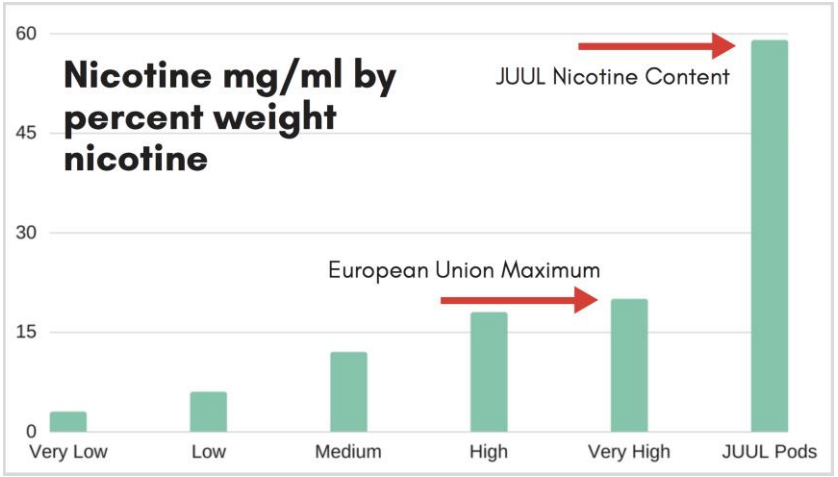


Nicotine content in juul

1 JUUL Pod

=

1 Pack of Cigarettes



CATCH My Breath In the News

Edutopia (June 2018)

Schools Respond to the Rise of Student Vaping

CNN (August 2018)

JUUL and the vape debate: Choosing between smokers and teens

CNBC (August 2018)

JUUL built an e-cigarette empire. Its popularity with teens threatens its future

High Teen Exposure to E-Cig Advertising

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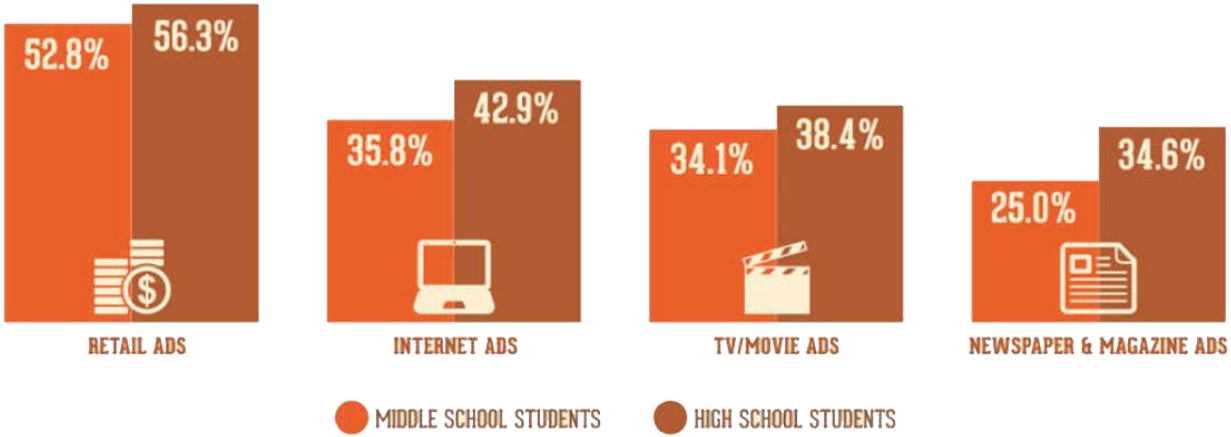
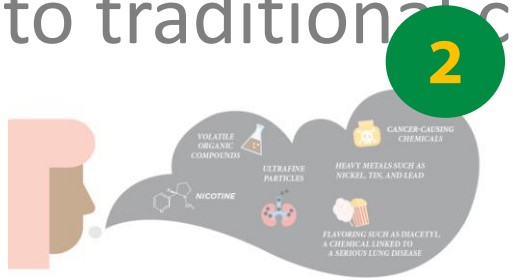


NIH National Institute on Drug Abuse

TO Recap…

1. Nicotine is harmful to developing brains.
2. Vapor contains other harmful chemicals.
3. E-Cigarettes & JUUL are normalizing tobacco and may lead to traditional cigarette use.



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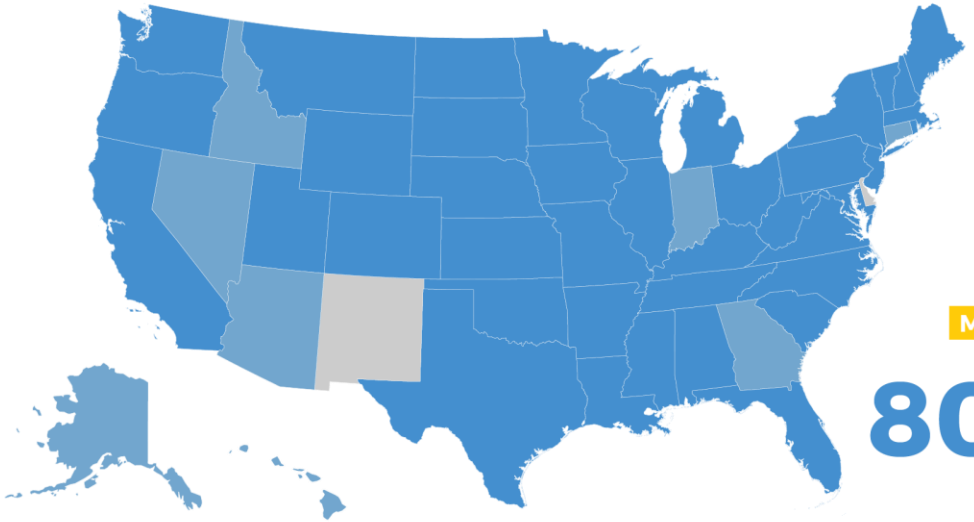
YOUTH E-CIGARETTE PREVENTION PROGRAM

CATCH My Breath Program Reach

To begin 2018-2019



42
STATES

225+
MIDDLE & HIGH SCHOOLS

80,000+
KIDS

A diverse community of support:

- Private Foundations
- State Education Agencies
- Local Departments of Health
- School Districts

UTHealth
The University of Texas
Health Science Center at Houston
School of Public Health
Austin

Now Available FREE for Middle & High Schools!

Get parent info: catchinfo.org/parent411

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CVS Health®

- Meets Nat'l Academic and Common Core Standards
- Meets SHAPE Health Education Standards

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Thank You!

Questions? Contact CATCH:

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Lung Injury Associated with E-Cigarette Product Use or Vaping

Outbreak of Lung Injury Associated with E=Cigarette Use, or Vaping

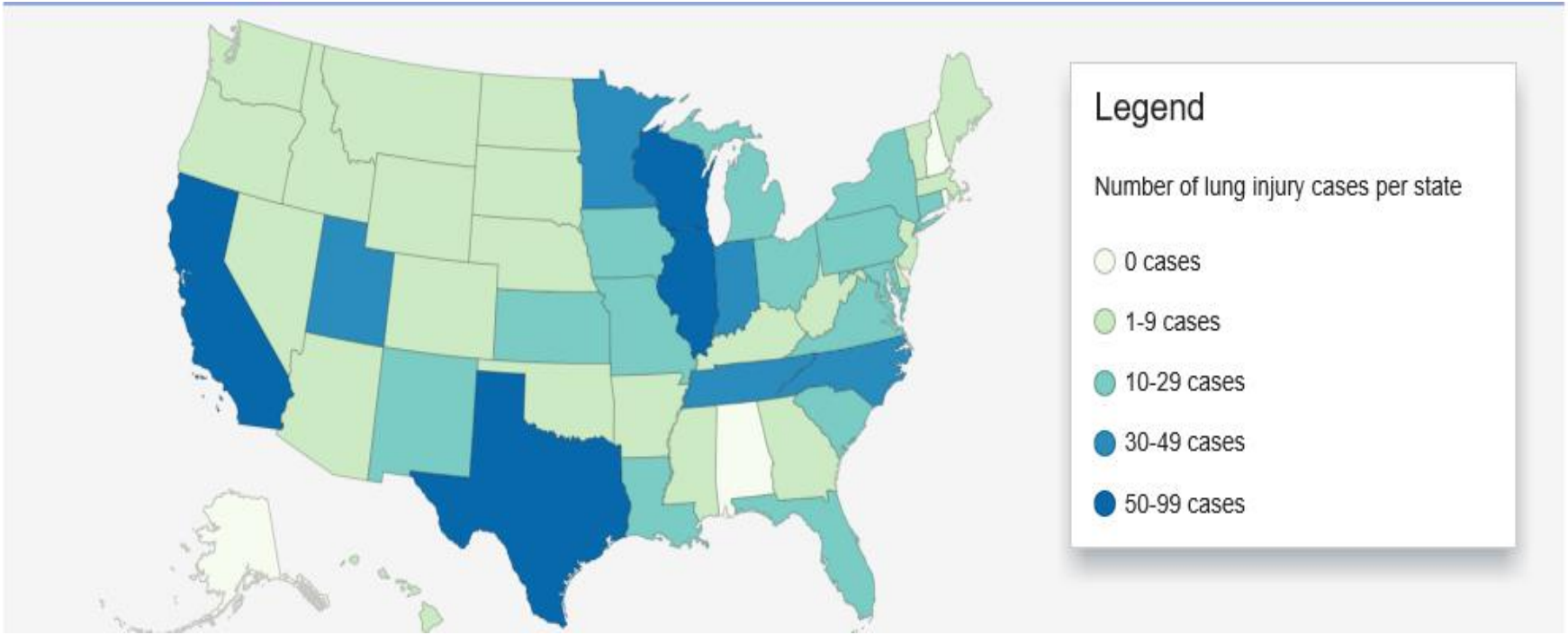
- There are 1080 lung injury cases reported from 48 states and I U.S.territory. (As of October 1,2019)

Eighteen deaths have been confirmed in 15 states

- CDC has received sex and age date on 771 patients
  - About 70% of patients are male
  - Nearly two third(62) of patients are 18 to 34 years old; with 22% of patients between 18-21.
  - 16% of patients are under 18 years
- All reported patients have history of e-cigarette product use or vaping

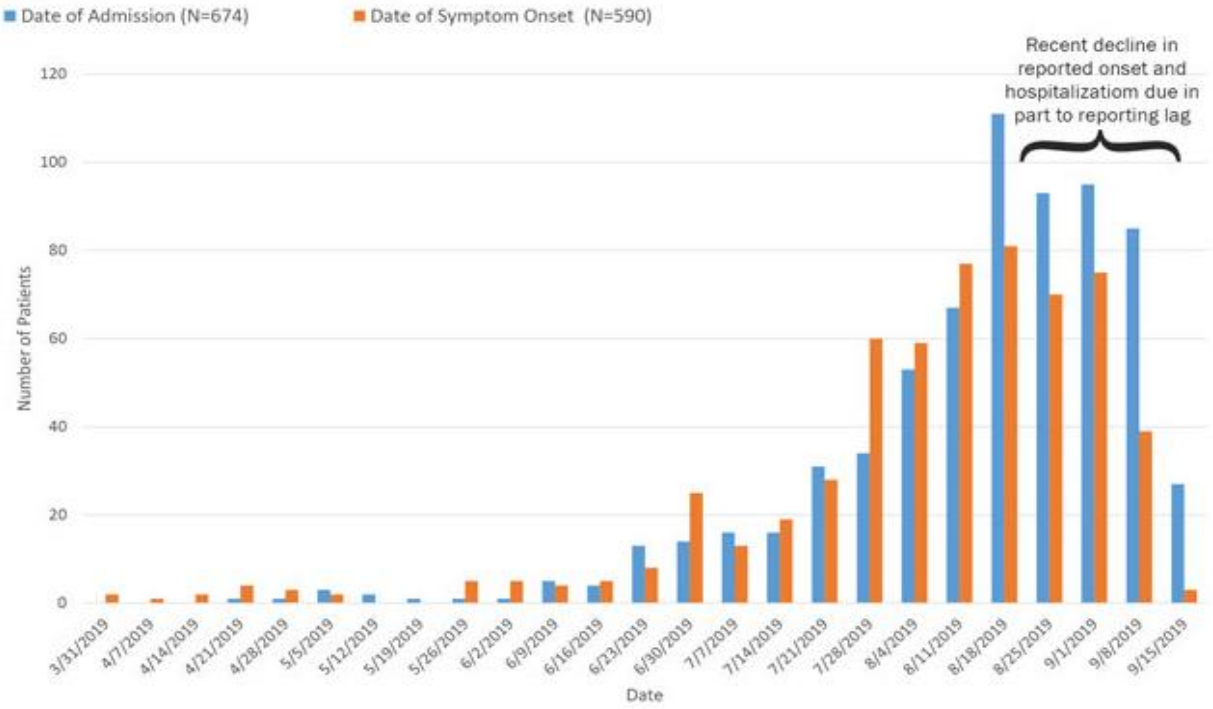
Latest findings from the investigation into lung injuries associated with e-cigarette,or vapinh ,suggest proocuddts containing THC play a role in the outbreak

Lung Injury Case Count



Source: https://www.cdc.gov/tobacco/basic_information/e-cigarettes/severe-lung-disease.html. Retrieved 10-2-2019

Dates of symptom onset and hospital admission for patients with lung injury associated with e-cigarette use, or vaping — United States, March 31–September 21, 2019



Source: https://www.cdc.gov/tobacco/basic_information/e-cigarettes/severe-lung-disease.html. Retrieved 10-2-2019

CDC Probable Case Definition (September 18, 2019)

- Using an e-cigarette ("vaping") or dabbing* in 90 days prior to symptom onset

AND

- Pulmonary infiltrate, such as opacities, on plain film chest radiograph or ground-glass opacities on chest CT

AND

- Infection identified via culture or PCR, but clinical team** believes this infection is not the sole cause of the underlying lung injury ***OR*** **Minimum criteria** to rule out pulmonary infection not met (testing not performed) and clinical team** believes this infection is not the sole cause of the underlying lung injury

AND

- No evidence in medical record of alternative plausible diagnoses (e.g., cardiac, rheumatologic, or neoplastic process)

**Clinical team caring for the patient.

CDC Confirmed Case Definition (September 18, 2019)

- Using an e-cigarette ("vaping") or dabbing* in 90 days prior to symptom onset

AND

- Pulmonary infiltrate, such as opacities, on plain film chest radiograph or ground-glass opacities on chest CT

AND

- Absence of pulmonary infection on initial work-up. **Minimum criteria** are
  - A negative respiratory viral panel ***and***
  - A negative influenza PCR or rapid test, if local epidemiology supports influenza testing; ***and***
  - All other clinically-indicated respiratory ID testing (e.g., urine Antigen for *Streptococcus pneumoniae* and *Legionella*, sputum culture if productive cough, bronchoalveolar lavage (BAL) culture if done, blood culture, HIV-related opportunistic respiratory infections if appropriate) are negative

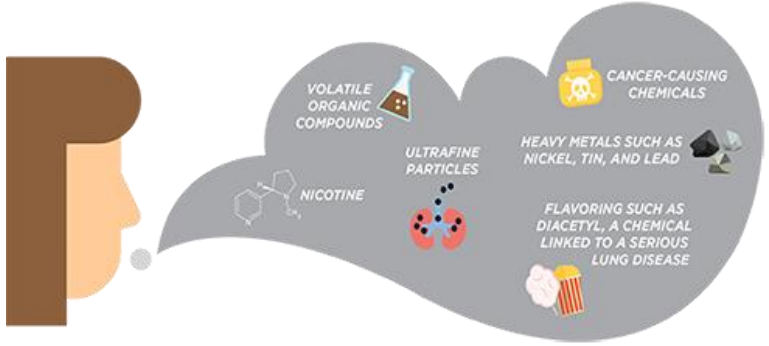
AND

- No evidence in medical record of alternative plausible diagnoses (e.g., cardiac, rheumatologic, or neoplastic process)

E-cigarette or Vaping Products

E-cigarette or Vaping Products: The Basics

- E-cigarette products include devices, liquids, flavorings, refill pods, and cartridges
- Devices heat liquid to produce an aerosol that is inhaled by the user
- E-cigarette **aerosol** can contain harmful or potentially harmful substances
  - Nicotine
  - Heavy metals (e.g., lead, nickel, tin)
  - Volatile organic compounds
  - Ultrafine particles
  - Cancer-causing chemicals
  - Flavoring (e.g., diacetyl)



Key Facts About E- Cigarette Use , or Vaping

- Electronic cigarettes or e-cigarettes are also called vapes,e-hookahs, vape pens, tank systems, mods and electronic nicotine delivery systems (ENDS).
- Using an e-cigarette product is commonly called vaping.
- E- cigarettes work by heating a liquid to produce an aerosol that users inhale into their lungs.
- The liquid that can contain: nicotine tetrahydocannabino (THC) and cannabinoid ((CBD) oils ,and other substances and additices. THC is the psychoactive mind altering compound of marijuana that produces “ high”.

E-cigarette Products: Devices

- Devices vary in shape, size, type, and manufacturer
- Common names
  - E-cigs
  - Vapes
  - E-hookahs
  - Vape pens
  - Mods
  - Tanks
  - Electronic nicotine delivery systems

E-cigarette Products: Liquids, Cartridges, and Pods

- E-cigarette **liquid** can contain
  - Nicotine
  - Flavorings
  - Propylene glycol and vegetable glycerin used in varying proportions as carriers
  - Other chemicals also present
  - Cannabinoids: Δ-9-tetrahydrocannabinol (THC), cannabidiol (CBD), butane hash oil (BHO)
  - Other substances
- E-cigarette liquid types
  - Commercial refillable e-liquid
  - Commercial non-refillable e-liquid
  - Homemade or street sources

E-cigarette Products: Behaviors

- Hacking: modifying device in a way not intended by the manufacturer
  - Refilling single-use cartridges (e.g., with homemade or illicit substances)
  - Dripping: dropping liquid directly onto device heating coil to attain higher compound concentrations in the aerosol

- Dabbing: superheating substances containing high concentrations of THC or other cannabinoids (e.g., budder, BHO, 710, CBD)

Clinical Features:

Frequent Clinical, Laboratory, Radiographic, and Pathologic Findings and Outcomes

Information Sources on Clinical Features

- Anecdotal and verified reports from health departments
- Formal and informal discussions between CDC, clinicians, and medical professional societies
- Recent publications in *Morbidity and Mortality Weekly Report* and *New England Journal of Medicine* (published September 6, 2019)
  - Schier JG, et al. Severe Pulmonary Disease Associated with Electronic-Cigarette–Product Use — Interim Guidance. *MMWR* 2019;68(36).
  - Layden J, et al. Pulmonary illness related to e-cigarette use in Illinois and Wisconsin—preliminary report. *NEJM* 2019.
  - Davidson K, et al. Outbreak of e-cigarette-associated acute lipoid pneumonia—North Carolina, July–August 2019. *MMWR* 2019;68(36).
  - Maddock S, et al. Pulmonary lipid-laden macrophages and vaping. NEJM 2019.
  - Henry TS, et al. Imaging of vaping-associated lung disease. *NEJM* 2019

Frequent Clinical Symptoms

- Most patients have been young and otherwise healthy
- Report gradual onset of various symptoms over days to weeks
  - Respiratory (cough, chest pain, shortness of breath)
  - Gastrointestinal (GI) (abdominal pain, nausea, vomiting, diarrhea)
  - Systemic symptoms (fatigue, fever, weight loss)
- GI symptoms sometimes precede respiratory symptoms
  - Tend to resolve quickly after admission
  - Evaluation for GI-related illness unrevealing
- Almost all published cases have been hospitalized
  - Many with ≥1 antecedent evaluation in ambulatory settings

Frequent Presenting Signs upon Hospital Admission

- Fever
- Tachycardia
- Tachypnea
- Hypoxemia (even in patients without respiratory symptoms upon presentation)
  - One of 53 patients in the recently published 53-case series in *New England Journal of Medicine** did not report respiratory symptoms, but had oxygen saturation of 91% on room air on admission

* Layden J, et al. Pulmonary illness related to e-cigarette use in Illinois and Wisconsin—preliminary report. *NEJM* 2019

Frequent Laboratory and Radiographic Findings

- Laboratory
  - Serum leukocytosis with neutrophil predominance
  - Elevated serum markers of inflammation (e.g., ESR, CRP)
  - Transient, mild elevation in serum transaminases
- Chest imaging
  - Abnormal findings may or may not be present on initial imaging, but develop eventually
  - Bilateral opacities on plain radiograph or ground-glass opacities on chest computed tomography (CT), often with sub-pleural sparing
- Imaging of abdomen/pelvis usually unremarkable except for bilateral opacities in cuts of lower lung fields included on CT

Clinical Course

- Initial therapies focused on presumed infectious etiologies
  - Empiric antibiotics with or without steroids
  - Observation with supportive therapy other than antibiotics or steroids
- Many patients have experienced sub-acute or acute hypoxemic respiratory failure requiring supplemental oxygenation and at times ventilatory support, including with intubation and mechanical ventilation or extracorporeal membrane oxygenation
- Patients who did not respond to antibiotics alone have tended to respond to systemic corticosteroids (either alone or concurrent with antibiotics)

Frequently Performed Diagnostic Evaluations

- Appropriate extensive evaluations for infectious etiologies often completed without an identified cause
- Use of pulmonary function testing has been highly variable, mostly depending upon institutional practices
- Some patients evaluated for lung injury with bronchoscopy with bronchoalveolar lavage or lung biopsy (either transbronchial or surgical via video-assisted thoracoscopic surgery [VATS] or thoracotomy)
  - Additional patients considered for these procedures but were too ill
  - Roles and frequencies of biopsy methods remain unknown

Evaluation of Pathologic Specimens

- Both routine histopathologic and special evaluations of specimens have been performed
- Routine processing of tissues includes the application of alcohol, which removes lipids
- Therefore, as a special evaluation, lipid-staining (e.g., Oil Red O, Sudan Black) has been performed on fresh tissues and bronchoalveolar lavage fluid

Spectrum of Clinical and Pathologic Diagnoses

- Acute lung injury and adult respiratory distress syndrome (ARDS)
- Diffuse alveolar damage
- Lipoid pneumonia
- Acute necrotizing pneumonitis
- Organizing pneumonia with lipid-laden macrophages
- Non-specific inflammation
- Hypersensitivity pneumonitis
- Eosinophilic pneumonia

Outcomes

- Specialists in pulmonary medicine, critical care, infectious diseases, pathology, or toxicology frequently involved in patients' care
- Despite illness severity, most patients have survived to hospital discharge
  - Most patients have been young and healthy pre-illness
  - Some patients who have not recovered to pre-illness pulmonary function at time of discharge, demonstrated improvement during post-hospitalization evaluation
  - Other patients still had reduced pulmonary function during post-hospitalization evaluation
  - 7 patients died in the hospital (as of September 17, 2019)

Recommendations for Clinicians

Recommendations for Clinicians: Overview

- History
- Diagnosis
- Clinical Management
- Evaluation of Pathologic Specimens at CDC
- Autopsy
- What to Tell Patients
- Case Reporting to Public Health Authorities

- **CDC will provide updates as more information becomes available**

Recommendations for Clinicians: History

- Ask patients who report e-cigarette product use, or vaping, within the last 90 days about signs and symptoms of respiratory illness

- Ask patients who present with signs and symptoms of respiratory illness about e-cigarette use, or vaping, within the last 90 days

- If e-cigarette product use is suspected as a possible etiology of a patient's respiratory illness, obtain a detailed history about e-cigarette product use, or vaping

Recommendations for Clinicians: History (Cont'd)—
e-cigarette product use

- Substances used: nicotine, cannabinoids (e.g., marijuana, THC, THC concentrates, CBD, CBD oil, synthetic cannabinoids [e.g., K2 or spice], hash oil, Dank vapes), flavors, or other substances

- Substance sources: commercially refillable e-liquids (e.g., bottles, cartridges, or pods), commercial non-refillable e-liquids, homemade or street sources

Recommendations for Clinicians: History (Cont'd)—
e-cigarette product use

- Devices used: manufacturer; brand name; product name; model; serial number of the product, device, or e-liquid; if the device can be customized by the user; and any product modifications by the user (e.g., exposure of the atomizer or heating coil)
  - Where the devices were purchased
  - Method of use: aerosolization, dabbing, dripping, or re-use of old cartridges or pods with homemade or commercially bought e-liquids
  - Sharing e-cigarette products (devices, liquids, refill pods, or cartridges) with others (to identify other cases)

Recommendations for Clinicians: Diagnosis

- Consider all possible causes of illness (e.g., infectious, rheumatologic, neoplastic) in patients reporting respiratory with or without GI symptoms and e-cigarette product use
- Consider consultation with specialists (pulmonary, infectious disease, critical care, medical toxicology, pathology) as clinically indicated
- Lipoid pneumonia associated with inhalation of lipids in aerosols generated by e-cigarettes, or vaping, has been reported based on the detection of lipid-laden alveolar macrophages obtained by bronchoalveolar lavage and lipid staining (e.g., Oil Red O, Sudan Black)
  - The decision about whether to perform bronchoalveolar lavage, with or without transbronchial biopsy, should be based on the overall clinical picture

Recommendations for Clinicians: Diagnosis (Cont'd)

- Lung biopsies have been performed on some patients
  - The decision about whether to perform biopsy (whether transbronchial or surgical) should be based on the overall clinical picture.
  - If a lung biopsy is obtained, consider lipid-staining during pathologic examination.* Because routine tissue processing involves the application of alcohols, which remove lipids, lipid-staining is best performed on fresh tissue.
  - Before the procedure consider consultation with pulmonary, critical care, pathology, or other specialties to inform any evaluation plan
  - However, conducting routine tissue processing and histopathologic evaluation is still important.

*** Additional information on lipid-staining is available at: https://www.cdc.gov/tobacco/basic_information/e-cigarettes/severe-lung-disease/healthcare-providers/index.html.**

Recommendations for Clinicians: Diagnosis (Cont'd)

- Contact public health officials as needed for technical assistance with laboratory testing, including for guidance regarding whether to retain specimens, storage instructions in the event of long-term storage, and collection of specimens for indications other than clinical care

- If retaining of specimens is anticipated, contact your facility's laboratory since routine practice might result in discarding of specimens before desired

Recommendations for Clinicians: Clinical Management

- Decisions regarding outpatient versus inpatient management should be based on individual clinical circumstances

- Evaluate and treat as appropriate for other possible causes of illness (e.g., infectious, rheumatologic, neoplastic)

- Consider consultation with specialists (pulmonary, infectious disease, critical care, medical toxicology)

Recommendations for Clinicians: Clinical Management (Cont'd)

- Clinical improvement of patients with lung injury associated with e-cigarette use, or vaping, has been reported with the use of corticosteroids
  - Dosing, route of administration, duration, and timing have varied
  - The decision to use corticosteroids should be made on a case-by-case basis based on risks and benefits and the likelihood of other etiologies

- Patients who have received treatment for lung injury related to e-cigarette product use, or vaping, should undergo follow-up evaluation as clinically indicated to monitor pulmonary function

Recommendations for Clinicians: Evaluation of Pathologic Specimens at CDC*

- If feasible, submission of formalin-fixed (wet) lung tissues is encouraged
- CDC's Infectious Disease Pathology Branch can perform lipid-staining on formalin-fixed (wet) lung tissues using osmium tetroxide before routine tissue processing and paraffin embedding
  - However, lipid staining cannot be performed on formalin-fixed, paraffin-embedded lung tissue blocks, because they have undergone processing that removes lipids
- CDC's Infectious Disease Pathology Branch will also review tissue histopathology and perform additional testing, including testing for possible infectious etiologies

*** Additional information on lipid-staining is available at: https://www.cdc.gov/tobacco/basic_information/e-cigarettes/severe-lung-disease/healthcare-providers/index.html.**

Recommendations for Clinicians: Evaluation of Pathologic Specimens at CDC* (Cont'd)

- Please first report any possible cases of lung injury associated with e-cigarette product use, or vaping, to your state, territorial, tribal, or local health department

- Pre-approval is required prior to submission of any tissue specimens. For pre-approval, health departments should contact pathology@cdc.gov and VapingAssocIllness@cdc.gov.

*** Additional information on lipid-staining is available at: https://www.cdc.gov/tobacco/basic_information/e-cigarettes/severe-lung-disease/healthcare-providers/index.html.**

Recommendations for Clinicians: Autopsy

- In the event of a fatal outcome, autopsies can be considered
  - Collection of fresh lung tissue for staining of lipids, formalin-fixed (wet) lung tissue, and submission of lung and other tissues for routine tissue processing, paraffin-embedding, and evaluation of histopathology should be considered
  - Infectious disease testing, including postmortem microbiology and molecular testing, should also be considered if indicated by patient history or autopsy findings

- Contact public health officials as needed for technical assistance with laboratory testing

Recommendations for Clinicians: What to Tell Patients

- Regardless of the ongoing investigation, e-cigarette products should not be used by
  - Youth and young adults
  - Pregnant women
  - Adults who do not currently use tobacco products
- Regardless of the ongoing investigation, anyone who uses e-cigarette products should
  - Not buy these products off the street (e.g., e-cigarette products with THC, other cannabinoids)
  - Not modify e-cigarette products or add any substances to these products that are not intended by the manufacturer
  - Monitor yourself for symptoms (e.g., abdominal pain, nausea, vomiting, diarrhea, cough, shortness of breath, chest pain)
  - Promptly seek medical attention if you have concerns about your health

Recommendations for Clinicians: What to Tell Patients

- For adults trying to quit tobacco product use, including e-cigarettes
  - Use evidence-based treatments, including counseling from a healthcare provider and FDA-approved medications
- During the current investigation of lung injury associated with e-cigarettes, or vaping, if you are concerned about these specific health risks
  - Consider refraining from using e-cigarette or vaping products
  - If you are an adult who uses e-cigarettes because you have quit cigarette smoking, do not return to smoking cigarettes
  - If you continue to use e-cigarettes, carefully monitor yourself for symptoms and see a healthcare provider right away if you have symptoms like those reported in this outbreak

Recommendations for Clinicians: What to Tell Patients (Cont'd)

- If you are concerned about harmful effects from e-cigarette products, call your local poison control center at: 1-800-222-1222

- Submit detailed reports of any unexpected tobacco or e-cigarette-related health or product issues to the FDA via the online Safety Reporting Portal: https://www.safetyreporting.hhs.govexternal icon

Recommendations for Clinicians: Case Reporting to Public Health Authorities

- Report cases of lung injury of unclear etiology and a history of e-cigarette product use, or vaping, within the past 90 days to your state or local health department
  - Reporting of cases may help CDC and state health departments determine the cause or causes of these pulmonary illnesses

- Determine if any remaining product, including devices and liquids, are available for testing
  - Coordinate testing with the local or state health departments

Recommendations for Clinicians: Additional Resources

- CDC will provide updates as more information becomes available

- CDC website with updates for the ongoing investigation of lung injury associated with e-cigarette products use, or vaping: https://www.cdc.gov/tobacco/basic_information/e-cigarettes/severe-lung-disease.html

References:

- https://www.cdc.gov/tobacco/basic_information/e-cigarettes/severe-lung-disease.html. Retrieved 10/2/2019